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Final
Interim Guidance on Double Liner Requirements for all Landfill Authorizations to Construct (ATC) Issued After December 20, 2000

Bureau of Waste Prevention

[original signed]
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Date

I. Introduction

The Beyond 2000 Solid Waste Master Plan, issued on 12/20/00, stated that the Department would require the use of double liners for all landfill capacity that was constructed after that date. The Master Plan also said the Department would use existing regulatory authority to implement this requirement until the solid waste regulations (310 CMR19.000) were revised. This interim guidance is to be used for determining double liner requirements until the regulations are revised to incorporate new requirements.

II. Policy Statement

The primary environmental advantage afforded by double liner systems over single liner systems is the leak detection/secondary collection function of a double liner system. A leak detection function allows the performance of the primary liner to be constantly monitored. A leak through the primary liner will be stopped before it reaches groundwater by the secondary liner. The secondary collection system between the primary and secondary liner will remove this leachate and allow for its quantity and quality to be monitored. A leak detection system can "protect" the capacity of the area being monitored by unequivocally demonstrating that the liner is functioning properly. If a leak should develop, corrective actions can be implemented to repair and stop the leak. The Department intends to require this leak detection function, wherever it is reasonably practical to do so, in all landfill capacity constructed after the effective date of the Master Plan (12/20/00).

There are three primary scenarios to consider when applying the double liner standard. The first scenario is where liners will be constructed over new or virgin areas where no previous solid waste has been placed and there is no existing liner. The second scenario is where additional waste will be placed over waste where there is no liner under the existing waste. The third scenario is where additional waste will be placed over waste where there is an existing liner in place.

In determining the liner components that should be used within a double liner design, the Department has decided that these interim requirements should reflect the Department's long standing use and support of composite technology in liner design. Therefore, each liner of the double liner system will be of a composite liner design, with different composite liner requirements for the primary and secondary liners. The requirements of this guidance are consistent with double liner designs the Department has approved in the past. Although this approach looks primarily at how each liner functions independently and does not look at how the entire double liner system works as an integrated unit, the Department has determined that this interim guidance should, appropriately, take a conservative position on this fundamental environmental protection component of a landfill design until further evaluation of double liner systems can be completed during the regulation development process.

In addition, this interim guidance provides variable liner requirements depending on the slope of the liner in recognition of the fact that leachate retention times are minimal on steeper slopes; therefore, the potential for leakage on such slopes is considerably reduced.

Regarding the issue of what requirements will apply where waste will be placed over an existing liner, the Department has taken the position that the existing liners in such affected areas should be a consideration in determining the additional groundwater protection measures needed in those areas. Section V of this guidance addresses the liner requirements for those areas that have an existing liner.

III. New landfills or lateral expansions of existing landfills constructed over virgin areas.
For any area where the slope of the liner will be less steep than 4 horizontal to 1 vertical (4:1) a double composite liner is required. This requirement will extend at least 5 feet up any adjacent slopes or berms to create a "bathtub" area with this liner requirement. All design components are listed from the top down:

- Option 1 – **Double composite liner**
    - Primary liner: flexible membrane liner (FML or geomembrane) / geosynthetic clay liner (GCL)
    - Leak detection/secondary collection: geonet or 12 inches 10-2 cm/sec material (this layer is referred to below as "geonet")
    - Secondary liner: flexible membrane liner (FML)/ 2 feet compacted clay liner (CCL)

- Option 2 – **Alternative double composite liner**
    - Primary liner: FML/GCL
    - Leak detection/secondary collection: geonet
    - Secondary liner: FML/GCL/1' CCL

For any area where the slope will be steeper than or equal to 4:1:

- Preferred Option – **Modified double composite**
  - Primary liner: FML/GCL
  - Leak detection/secondary collection: geonet
  - Secondary liner: FML/ 1' CCL

- The following **double liner** design options are also acceptable:
  - Primary liner is a single element, secondary liner is composite
    - Primary liner: FML
    - Leak detection/secondary collection: geonet
    - Secondary liner: FML/2' CCL
  - Primary liner is a single element, secondary liner is composite
    - Primary liner: FML
    - Leak detection/secondary collection: geonet
    - Secondary liner: FML/ GCL/1' CCL

IV. Vertical expansions over previously landfilled areas that have no existing liner
Same requirements as III above. However, alternative equivalent designs may be approved based on technical concerns related to stability issues caused by settlement etc. for slopes steeper than 4:1.

V. Vertical expansions over previously landfilled areas that are lined by an existing liner
Through this guidance, the Department is requiring that landfill capacity approved after the effective date of this guidance be constructed with a double liner with leak detection function. However, the Department recognizes that an existing composite liner (or double liner that does not meet the requirements of section III) is an effective low permeability layer and, where an existing liner (designed and constructed in accordance with the minimum liner standards of the regulations in effect after 7/1/90) is functioning properly, it should be given consideration when evaluating the environmental protection requirements at that site. Therefore, in place of a double liner system design, the Department may consider alternative designs based on the considerations described below. Alternative design proposals must consist, at a minimum, of a system that provides a hydraulic separation between wastes disposed in accordance with an approval issued after the effective date of this guidance and capacity approved prior to this guidance.

Performance standard: The hydraulic separation layer shall be constructed using technologies or components that will result in a system that prevents, to the maximum extent possible, leachate generated in areas approved after the effective date of this guidance from mixing with leachate collected in areas approved prior to this guidance. In general, such systems shall use combinations of low permeability barriers and high capacity drainage systems. All leachate intercepted by the hydraulic separation layer shall be directed to and collected in a double composite lined area.

Design Standard: For facilities disposing of MSW over an existing single composite liner functioning as designed, where the expansion area will operate for approximately 2 years or longer before installing a cap, and where the slope of the hydraulic separation layer will be

steeper than 4:1, the presumptive design standard to meet the performance standard above shall be a single component (element) liner, such as an FML, GCL or 18" of 10-7 cm/sec soil, in conjunction with a high performance drainage layer consisting of 12" of 10-3 cm/sec soil or 12" of less permeable soil in combination with a synthetic drainage layer such as a geonet.

Further Considerations. The Department may place additional requirements on the facility design in the interests of protecting the public health, safety or environment when the following considerations are evaluated. Conversely, alternative designs that have different requirements than the presumptive design standard may be approved, where appropriate, after evaluation of the considerations below. The Department will not approve a less stringent design than the presumptive design unless the applicant provides sufficient data to support the proposed design, based on the considerations below, to persuade the Department that it should not require the presumptive design.

Considerations:

- Slope of the hydraulic separation layer
- Type of wastes being disposed
- Permeability of the waste material
- Settlement potential of the waste material
- Characteristics of the leachate generated
- Duration of the landfilling activity in the expansion area
- Quantity of material being disposed
- Type and condition of existing low permeability and drainage materials used for final or intermediate cover
- Location (hydrogeologic setting, human and environmental receptors, etc.)
- Type and operating performance of existing liners at the site
- Existing contamination at the site
- Other considerations pertinent to protecting the public health, safety or the environment

More stringent requirements. Examples of when more stringent liner requirements, such as double liners with leak detection, will be the presumed requirement:

- Where an existing liner is not operating properly
- Where the slope of the separation layer will be less steep than 4:1
- Where the landfill is located in a sensitive environmental location such as a sole source aquifer

Less stringent requirements. Examples of when less stringent requirements may be considered by the Department:

- Where MSW ash, C&D waste or other single source waste types are being disposed when considering the permeability, leachate quality or other characteristics of the waste.
- Where the operating time in an area, before capping, will be less than 2 years (segmentation of project length is not allowed)
- Where an existing double liner underlines the affected area